U.S. Department of Transportation
Research and Special Programs Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

JUN 21 1993

DOT-E 10045
(FIRST REVISION)

EXPIRATION DATE: June 1, 1995

1. GRANTEE: Federal Express, Memphis, TN.

2. PURPOSE AND LIMITATION: This exemption authorizes highway transportation and temporary storage incident to that transportation of non-fissile radioactive materials packages with relief from the combined transport index limitations and the restrictions on separation distances. This authorization is only for specific points of origin to specific destinations. No relief is provided from any regulations other than as specifically stated in this exemption.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR Sections 173.447(a), 177.842(a) and (b).

5. BASIS: This exemption is based on Federal Express' application dated November 27, 1992 submitted in accordance with 107.105 and application dated January 14, 1993, submitted in accordance with 49 CFR 107.103 and the public proceeding thereon.

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous materials description/proper shipping name	Hazard Class (Written Class) class number	Identification number	Packing Group
Radioactive materials, n.o.s.	(Radioactive Materials) Class 7	UN2982	N/A
Radioactive materials, special form, n.o.s.	(Radioactive materials) Class 7	UN2974	N/A
Radioactive materials, LSA, n.o.s.	(Radioactive materials) Class 7	UN2912	N/A
Radioactive materials, excepted package-	(Radioactive materials) Class 7	UN2910	N/A

NOTE: Effective October 1, 1993, the appropriate numeric hazard class or division descriptions must be used in place of the written hazard class descriptions.

7. SAFETY CONTROL MEASURES:

a. Packaging. Packagings shall meet either Type A or Type B performance standards; but the radioactive material excepted packagings must meet only the general performance requirements.

b. Radiation Protection Program.

(1) The exemption holder shall establish and maintain a radiation protection program, as described in Annex A, to monitor and control radiation hazards of the transport and storage activities described in paragraph 8(b).

(2) A health physicist shall technically supervise the radiation protection program, and he must perform the functions and meet the qualification requirements described in Annex B.

(3) Training provided to workers performing the loading and storage functions shall satisfy the requirements of 49 CFR Part 172, Subpart H, and shall include but not be limited to the subjects identified in Annex C.

8. SPECIAL PROVISIONS.

a. Relief from Transport Index and Separation Distance Restrictions. The exemption holder is authorized to transport radioactive material packages in unit load devices (ULD's) and motor vehicles without regard of the Transport Index totals and separation distance restrictions of 49 CFR 177.842(a) and (b). The temporary storage of the packages and the ULD's associated with the transport by motor vehicle is permitted without regard to the limitation in 49 CFR 173.447(a). These transportation and storage activities are described in paragraph 8(b). Many of these packages are to be continued in transportation by air under DOT-E 7060.

b. Approved Transport Routes and Storage Activities.

(1) Packages are loaded into ULD's at Dupont-Merck Pharmaceutical Company, North Billericia, MA and are transported by motor vehicle to the Federal Express facility or directly to aircraft at Logan International Airport, Boston, MA.

(2) Packages from CIS US, Inc, Bedford, MA or Amersham Corporation, Burlington, MA, are loaded into ULD's at the Federal Express facility, Lexington, MA and are transported by motor vehicle to the Federal Express facility or directly to aircraft at Logan International Airport, Boston, MA.

(3) Packages are loaded into motor vehicles or ULD's at Mallinckrodt Medical, Inc., Maryland Heights, MO and are transported to the Federal Express facility or directly to aircraft at St. Louis Lambert International Airport.

(4) Packages are loaded into motor vehicles at Mallinckrodt Medical, Inc., Maryland Heights, MO and/or at Federal Express Corporation, St. Louis, MO and are transported from St. Louis, MO directly to the Federal Express hub at Memphis International Airport, Memphis, TN.

c. Annexes to Exemption. This exemption incorporates Annex A, Annex B, and Annex C with the same requirement for compliance as other parts of the exemption. The improvements in the radiation protection of workers and the public resulting from the requirements of Annex A and Part I of Annex B are the main reasons for the granting of the exemption. Annex C and Part II of Annex B state general requirements to ensure the quality of the radiation protection program.

9. MODES OF TRANSPORTATION AUTHORIZED. Motor Vehicle

10. MODAL REQUIREMENTS:

a. In addition to the regular shipping papers that must be carried in the vehicle as required by 49 CFR Part 172, Subpart C, the exemption holder shall ensure that the following documents are conspicuously available in each motor vehicle operating under this exemption:

(1) The hazardous materials information, emergency response instructions, and telephones numbers as required by paragraph V(F) of Annex A.

(2) Evidence that the vehicle operator has satisfactorily completed a training course in the hazards associated with radioactive materials as required by paragraph II(C)(2) of Annex A;

(3) A copy of the radiation survey record required by paragraph III(A)(4) of Annex A.; and

(4) A copy of this exemption.

b. Packages marked with the proper shipping name Radioactive material, fissile, n.o.s. and packages marked or otherwise identified as containing undeveloped photographic film or other radiation sensitive products shall not be transported in the ULD's or motor vehicles transporting packages under this exemption.

11. COMPLIANCE. Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Hazardous Materials Transportation Act:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
- Any use or application of this exemption, including display of its number, when the exemption has expired or it is otherwise no longer in effect unless a regulation has been amended making the exemption no longer necessary.
- Registration required by 49 CFR 107.601 et seq., when applicable.

12. REPORTING REQUIREMENTS:

a. In addition to the requirements of 49 CFR 171.15, in the event of any occurrence that results in a suspected release of radioactive material, or a personnel radiation exposure exceeding the levels cited in 29 CFR 1910.96 (b)(1), the exemption holder shall make a telephone report of the occurrence within one working day and a written report within 7 working days to the Associate Administrator for Hazardous Materials Safety (AAHMS).

b. To meet the notification and reporting requirements of 29 CFR 1910.96(1), the exemption holder shall direct all required notices and reports to the AAHMS, in lieu of the Assistant Secretary of Labor.

c. The exemption holder operating under this exemption shall notify, in writing, the AAHMS of any changes of key personnel responsible for the radiation protection program within 30 days of the change.

d. Within 75 days after the end of each calendar quarter, the exemption holder shall submit to the AAHMS a report including the following: (i) the results of the radiation dosimetry program required by paragraph II(C) of Annex A, including the name, job category, and cumulative quarterly and annual doses of all monitored individuals; (ii) a description of the activities conducted by the health physicist during the quarter under this exemption as required by paragraph I(C) of Annex A; (iii) A summary of the results of the radiation level surveys required by paragraph III(A)(4) of Annex A; (iv) any changes to the radiation safety program as determined by the requirements of paragraph I(A)(2) of Annex A; and (v) an estimate of the total TI transported under the exemption and outside the exemption during the quarter.

Issued at Washington, D.C.:

JUN 21 1993

Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

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Dist: FHWA

Radiation Protection Program.

I. **Responsibilities.**

A. Exemption holder management shall:

(1) Establish and maintain a radiation protection program in accordance with this Annex,

(2) Enlist the services of a health physicist to technically plan and supervise radiation protection program activities and to provide management with information and recommendations for improving the radiation protection program, and

(3) Ensure that the requirements of the radiation protection program, the exemption, and all other applicable regulations are satisfied.

B. Workers shall:

(1) Perform package handling and other transport activities covered by this exemption in an effective manner to keep radiation exposures to self and others As Low As Reasonably Achievable (ALARA), and

(2) Conduct work activities in accordance with the requirements of this exemption and other applicable requirements of the DOT regulations. Additionally, work shall be done according to instructions, training, and other information received from the exemption holder's management and from the health physicist.

C. Health physicist shall:

(1) Plan and conduct technical activities under the radiation protection program on behalf of the exemption holder,

(2) Perform the functions described in Part 1 of Annex B, and

(3) Asses effectiveness of the radiation protection program, and provide recommendations for improvement to the exemption holder.

II. **Scope, Basic Standards, and Criteria.**

A. Personnel Covered. The radiation protection program shall address the radiation exposures to workers directly handling and transporting the radioactive material packages, as well as, potential radiation exposures to members of the general public and workers whose duties do not involve handling or proximity to the packages. Exemption holder employed workers, and workers controlled by contract or other agreement, are included in the program if multiple packages are handled repeatedly either within or outside the total TI/separation distance criteria of the regulations.

B. Regulatory Standards and Limitations. The radiation protection program shall be in accordance with the regulations of the Occupational Safety and Health Administration of the Department of Labor, 29 CFR 1910.96. However, certain paragraphs of that standard, as identified below, do not apply to this radiation protection program.

(1) The higher quarterly dose, dependent on cumulative dose, as allowed by 29 CFR 1910.96 (b)(2) is not permitted. The whole body dose limit/quarter is 12.5 mSv (1250 mrem).

(2) The radiation dose to an unborn child shall not exceed 5 mSv (500 mrem). Without discrimination to the female in the work-place, this limitation of the dose to the unborn child shall be accomplished by limiting the occupational radiation dose to the declared pregnant female to 5 mSv (500 mrem) over the entire period of the pregnancy.

(3) The airborne radioactive material provisions of 1910.96(c) are not applicable.

(4) Providing radiation dosimetry devices to workers is not controlled by 29 CFR 1910.96(d)(2); rather, it is to be based on the requirements of paragraph II(C) of Annex A and the recommendations of the health physicist.

(5) The posting and marking of work areas and containers and alarm systems identified in 29 CFR 1910.96(e) and (f) are not applicable to the radiation protection program.

(6) The annual expected dose to individuals in the general public shall be less than 1 mSv (100 mrem) and efforts should me made to keep these doses to a fraction of that value.

C. Radiation Dosimetry and Training. Exemption holder employees and persons under contractual or other agreement control of the exemption holder who repeatedly handle or are in proximity to radioactive material packages during transport or storage shall be provided radiation dosimetry devices and radiation protection training.

(1) All workers whose activities may be expected to result in handling packages with the sum of the TI of the packages exceeding 200 in a period of one year must be provided radiation dosimetry devices. This applies to exemption holder employees and workers whose activities are controlled by contracts or other agreements with the exemption holder. However, a worker who handles or is in proximity of packages with TI's exceeding 200/year does not need to be provided dosimetry devices if the exemption holder has an evaluation of the worker activities signed by the health physicist that demonstrates that the anticipated radiation dose expected to be received by the worker will be less than 1 mSv/year (100 mrem/year). The radiation dosimetry devices and dosimetry services shall be obtained from a technically competent company or organization based on the recommendations of the health physicist who technically supervises the radiation protection program. It is the joint responsibility of the worker and his supervisor to ensure that the provided dosimetry devices are worn when a worker is handling or is in proximity to radioactive material packages.

(2) The training workers receive shall be appropriate to the nature of the worker activities and the potential for receiving significant radiation doses. Annex C includes subjects that are considered appropriate for inclusion in a program for training persons who handle large numbers of radioactive material packages under the exemption. Periodically, retraining and examinations shall be given to measure the competency or understanding of the subject matter.

(3) The health physicist shall make recommendations concerning the scope of the training given to workers based on their work activities. Similarly, he shall recommend the type and exchange rate for the radiation dosimetry devices provided to the workers.

D. Performance - Radiation doses received under the radiation protection program are justified because of the benefits associated with the end use of the radioactive materials being transported under the radiation protection program. The package handling and transport activities shall be conducted using methods and techniques designed to keep the individual and collective radiation doses to workers and members of the general public As Low As Reasonably Achievable (ALARA).

III. Package Handling, Transport, and Storage Activities.

A. Involved Workers.

(1) Activities shall be conducted using the principals of time, distance, and shielding to keep the doses received from the radioactive material packages ALARA. Recognize that the transport index (TI) of a package or a group of packages is related to the dose that might be received during package handling. Time near packages must be kept as short as possible. Carts and dollies should be used when possible to increase distance during package movement. Heavy materials or other packages will help shield the radiation from packages with higher TI values.

(2) Workers shall perform their functions in accordance with the instructions, procedures, and training received from management and the health physicist which are intended to allow prompt effective delivery of needed products in a manner that is safe for workers, the general public, and the environment.

(3) Radiation dosimetry devices are always to be worn and only worn during operations when occupationally involved with radioactive material packages. They are to be returned on schedule when replacement dosimetry devices are received.

(4) After motor vehicles are loaded with ULD's or packages for transport as stated in paragraph 8(b) of the exemption, the radiation levels outside the vehicle shall be measured and recorded with a calibrated survey meter and shall not exceed the levels indicated in 49 CFR 173.441(b)(2) and (3), ie. 2 mSv/h (200 mrem/h) at vehicle surface and 0.1 mSv/h (10 mrem/h) at two meters.

(5) Operation of motor vehicles including the stops and parking during transit shall be done with consideration for minimizing radiation exposure to members of the general public.

B. Exemption Holder Management and Health Physicist.

(1) Activities shall be planned and arranged to ensure that workers are provided with the necessary instructions, procedures, and training that will allow work to be accomplished effectively in accordance with the requirements of the regulations and this exemption.

(2) Management shall maintain and update a schedule of expected transportation activities and a record of the transport activities actually performed as described in paragraph 8(b) of the exemption. This record shall indicate the shipments that are made within the TI/ separation distance requirements of the regulations and those made under the relief granted by this exemption. The schedule and records shall include the day of the week, and the approximate time of the operation.

IV. **Emergencies and Abnormal Occurrences.**

A. Management Responsibilities.

(1) With the assistance of the health physicist, management shall develop plans and procedures to deal with emergencies and abnormal occurrences that range from no radiological consequence events to accidents with releases of radioactive material from multiple packages.

(2) The management or the health physicist shall contact the appropriate local and/or state official at the locations or along the transport routes for the activities under this exemption to provide information and awareness of the activities.

(3) The management or the health physicist shall provide and update at least quarterly the hazards and emergency response information carried with the shipping documents as described in paragraph 10(A)(4) of the exemption.

B. Worker Responsibilities.

(1) Persons handling and transporting packages shall be familiar with the documents carried with the shipping papers that explain the hazards of the materials being transported and provide guidance and information for response to emergencies and abnormal occurrences. Unless directed otherwise by authorized public officials the provided emergency instructions and procedures shall be followed during abnormal occurrences.

(2) Under nearly all foreseeable emergency conditions, life saving and conventional emergency actions shall be done with little regard to the probable lower radiological risks.

V. **Documentation and Record Keeping.**

A. OSHA Standard and this Exemption. A copy of the Department of Labor, Occupational Safety and Health Administration (OSHA) standard, 29 CFR 1910.96, along with a copy of this exemption shall be posted in workplace locations conveniently available to workers whose activities are controlled or effected by this exemption. If workers request copies of these documents or other documents appropriately noted in this Annex, the exemption holder shall make them available promptly without questions. In the copies of 29 CFR 1910.96 that are posted or made available to workers, the sections that are not applicable to this exemption ((b)(2); (c); (d)(2); (e); and (f)) shall be conspicuously identified by marking "N/A" in the margin to the left of the paragraph.

B. Radiation Dosimetry.

(1) Records of the radiation doses received by individual workers based on results obtained from contracted dosimetry reports shall be maintained for a period of at least ten years, which is a substantial period of the workers lifetime. These records shall include explanations of adjustments to the radiation doses based on evaluations by the health physicist of anomalies or inconsistencies between the data obtained with dosimeters and the activities of the workers and of the radiation protection program.

(2) At least annually the exemption holder shall advise workers that the results of their year to date and cumulative occupational radiation dose received under the radiation protection program; alternatively, the worker may be notified that this information is available if requested.

(3) When occupational radiation dose information is requested by a worker or after a worker is no longer employed, the worker shall be provided the information within ninety days.

C. Health Physicist Activities.

(1) A record summarizing the activities of the heath physicist, as described in paragraph I(C) of this Annex and in section (I) of Annex B, shall be included in each quarterly report as required by paragraph 12(d).

(2) All written recommendations concerning the improvements of the radiation protection program submitted to the exemption holder by the health physicist shall be maintained on file by the exemption holder for at least five years and made available to DOT authorized officials on request.

D. Radiation Surveys. Records of the measurements of the radiation levels outside the vehicles prior to transit, as required by paragraph 10(a)(1) of the exemption and paragraph III(A)(4) of this Annex, shall be maintained by the exemption holder for a period of two years and made available to DOT authorized officials on request.

E. Training. Records of training shall be maintained as required by 49 CFR 172.704(d).

F. Hazards and Emergency Response Information. The exemption holder and the health physicist shall prepare hazards and emergency response information to be carried in the vehicle along with the shipping documents normally required by the regulations. This information shall supplement the shipper supplied information required by 49 CFR 172.600 - 604.

(1) General description of packages shall include physical characteristics (size, weight, outside materials, appearance, etc.) and the radiation hazards presented by individual and groups of packages under normal transport conditions and during accident conditions involving both no damage and significant damage to single and large numbers of packages.

(2) Procedures for vehicle operators should cover occurrences ranging from minor occurrences such as delays, to more significant occurrences such as mis-located or lost packages, to emergencies involving injuries or releases of radioactive contents in an accident. These procedures should emphasize keeping exemption holder management well informed, cooperating with local officials, and perspective that life saving and most emergency actions take precedence over most radiological risks.

(3) Suggestions/guidance for emergency responders must be conspicuously located in vehicle in case the vehicle operator is incapacitated. This information should include the general description in paragraph V(F)(1) and the subject areas in the Guides in the DOT Emergency Response Guidebook (ERG). There should be an explanation as to why specific statements in Guide 63 of the ERG might not be appropriate for the shipments under this exemption. Points of contact for additional information or assistance should include both normal hours and after hours, names, and phone numbers. These points of contact should include:

(a) Exemption holder representatives and/or the health physicist;

(b) State officials, and when appropriate local officials, with responsibilities for radiological emergencies. This list should include responsible officials along the specific routes traveled under the exemption; and

(c) Federal agencies that can provide radiological information or assistance to state and local emergency responders as identified in paragraph (b).

Functions and Qualifications of the Health Physicist

I. **Functions:**

The health physicist must--

A. Provide the technical guidance and supervision for the radiation protection program required by paragraph 7(b)(2) and Annex A.

B. Conduct or arranges for and maintains records of the training required by paragraph 7(b)(3).

C. At least semi-annually personally observe and evaluate each type of operation conducted under the exemption.

D. At least annually observe and assess the actions of each person working under the exemption covered by the radiation protection program. The health physicist must discuss with the person being observed the results of any assessment performed pursuant to this item.

E. Review vehicle radiation survey records that are prepared in compliance with paragraph 10(a)(1). Records of these surveys must include the date and location of the survey, the survey method, and the calibration date of the survey instrument used.

F. Develop procedures for ensuring that radiation levels for persons not included in the radiation protection program meet the requirements of paragraph II(B)(5) of Annex A.

G. Ensures that workers under the radiation protection program are provided radiation dosimetry devices on an appropriate schedule in accordance with paragraph II(C)(1) of Annex A.

H. Assess the radiation dose for each individual covered by the radiation protection program. The assessment must include a review of monthly personnel monitoring reports with respect to quarterly, year-to-date exposure limits and lifetime radiation accumulation. A report detailing the name, occupation, monthly, quarterly and year-to-date exposure of monitored individuals, the total exposure of all monitored individuals in person-rem, and a statistical distribution of the exposures will be prepared for inclusion in the quarterly report required in paragraph 12(d) of the exemption.

I. Conduct or arrange for necessary and at least annual calibration of radiation survey equipment used by exemption holder staff and record the type and date of calibration of the survey instruments.

II. **Basic Qualifications:**

A. A health physicist performing activities under DOT-E 10045 must meet the following requirements:

1. Possess a Bachelor's degree in a science or engineering subject; or

2. Demonstrate education and experience equivalent to a Bachelor's degree in a science or engineering subject;

3. Demonstrate a minimum of 3 years of responsible experience in health physics. This experience must include evaluation of work activities and developing methods to reduce radiation doses while performing job functions; and

4. Familiarity with transportation activities and the regulations for domestic and international transport of radioactive material.

Subjects to be Included in the Training Required by Paragraph 7(b)(3) of DOT-E 10045, 1st Rev.

I. **Elementary Radiological Safety.**

A. Basic terms.

1. Radioactive materials
2. Radiation
3. Radioactivity
4. Contamination

B. Radiation exposure.

1. External and internal
2. Protection factors

a. External - time, distance, and shielding; and

b. Internal - avoid ingestion or getting material into body.

C. Dose rates and doses.

1. Relationships between dose rate and dose. (For example, the dose for two hours and for 15 minutes are twice and one fourth the per hour dose rates).
2. Dose rate and dose examples.

a. Dose limit for general public or occupational worker not under radiation protection program.

b. Dose limit for occupational workers under radiation protection program.

c. Dose for medical procedures.

d. Life endangering dose range.

e. Background levels and their influential factors.

D. Radiation risks and exposure minimization.

1. Any increases of exposure increases risks for cancer or genetic damage.

2. All occupational radiation exposures should be kept as low as reasonably achievable (ALARA). Radiation doses shall be kept less than the limits for individual workers and individual members of the public and the total dose received by all workers and all members of the public shall be minimized.

II. **Transportation of Radioactive Materials.**

A. Packages.

1. Description of packages normally handled under exemption:

a. How are they constructed?

b. Why are some light and some heavy?

2. Other common radioactive material packages.

3. Differences between Limited Quantity, Type A and Type B (Quantity and Packagings).

4. Difference between "normal form" and "special form" radioactive materials in a package.

5. Difference between "fissile" and "fissile exempt" packages.

B. Labels, radiation levels, and placards.

1. Package radiation levels generally increase from White I, to Yellow II, to Yellow III labels.

2. Label type on RAM packages depends on radiation level at package surface and at 1 meter.

3. Transport Index (TI) is equal to maximum radiation level in millirem per hour at 1 meter from the package.

4. A highway vehicle with any Yellow III labeled packages must be placarded on all four sides.

C. Shipping paper required information, and their purposes.

D. Controlling radiation exposure.

1. Normal regulatory requirements (without exemption).

a. Limitations on the surface dose rates and TI of packages.

b. A limit on the total Transport Index of all packages, e.g., 50 TI for highway vehicle.

c. Separation distances from nearest RAM packages to occupied spaces depends on total TI in vehicle.

E. Good practices in handling RAM packages.

1. Avoid unnecessary time near RAM Packages.

2. Stow packages to minimize handling and exposure.

3. Use mechanical means to provide separation distance when moving package, when available and practical (i.e. handcarts and dollies).

4. Stow packages away from occupied spaces if possible.

5. If possible stow White I and Yellow II (low TI packages) between Yellow III packages and occupied spaces.

III. **Exemption 10045 Specific Subjects.**

A. Packages in unit load devices (ULD's) and motor vehicles are transported directly to aircraft or facilities at airports in a manner that reduces package handling and the resultant radiation doses to workers.

B. Operations authorized only from specific points of origin to specific destinations at airports.

C. Radiation protection program includes:

1. Use of radiation dosimetry devices.

2. Compliance of program with OSHA standard (29 CFR 1910.96).

3. Radiation exposures that are as low as reasonably achievable (ALARA).

4. Training (exemption, 49 CFR and 29 CFR).

5. Worker doses to be limited to 1250 mrem per quarter.

6. Notification of workers of their current and cumulative radiation dose, on request.

D. After loading and before departure vehicle radiation levels must be monitored and recorded.

1. Highway vehicle radiation levels must not exceed the limits of 49 CFR 173.441(b)(2), and (3).

a. 2 mSv/hour (200 mrem/hour) at surface of vehicle.

b. 0.1 mSv/hour (10 mrem/hour) at 2 meters from vehicle.

E. Special papers are required to be in the vehicle with other shipping documents required by regulations.

1. Copy of the exemption (E-10045).

2. Certificate of training signed by the health physicist.

3. Vehicle radiation survey record.

4. Emergency procedures for incidents involving RAM packages.

a. Instructions for vehicle operators.

(1) Actions to be taken to isolate materials and keep people away.

(2) Life-saving actions.

(3) Nonradiological factors.

(4) Notification of corporate officials.

(5) Notification and cooperation with local, state, and federal authorities.

b. Additional information and suggested instructions for emergency services personnel to follow if the operator is incapacitated.

(1) General description of type of RAM carried under exemption.

(2) Who in the company (or company emergency response representative) to contact for further information about RAM in shipment.

(3) General guidance for coping with emergencies such as damaged packages, fire, and injured operator(s).

c. Contacting instructions and listing of names and phone numbers (regular hours and off-duty hours) of State and Federal authorities.

F. Quarterly reports to DOT.

1. Radiation dose reports.

2. Vehicle radiation survey summaries.

3. Descriptions and assessment of efforts to keep exposures ALARA.

4. Description of the health physicist activities (e.g., where, when, who and what).

G. Incidents and certain abnormal occurrences must be reported to DOT by telephone within one working day and by mail within seven working days.

H. Packages containing radioactive materials with the proper shipping name "Radioactive materials, fissile, n.o.s." and packages identified as containing undeveloped photographic film or other radiation sensitive products may not be transported with the radioactive material packages carried under the exemption.

I. Operating procedures must be established to assure there is no unnecessary radiation exposure to personnel not handling the packages, but who may be near the packages or vehicle.

J. A copy of DOT-E 10045 and 29 CFR 1910.96 must be posted in the carrier's point of origin work place or other convenient locations for reading by workers. Copies will be made available to the workers if requested.

MAR 14 1989

DATE: _____
Annex 1 to DOT-E 8308

SUBJECTS TO BE INCLUDED IN THE TRAINING REQUIRED BY

PARAGRAPH 7.d. OF DOT-E 10045

1. Elementary radiological safety

A. Basic terms.

1. Radioactive materials

2. Radiation

3. Radioactivity

4. Contamination

B. Radiation exposure.

1. External and internal

2. Protection factors

a. External - time, distance, and shielding; and

b. Internal - avoid ingestion or getting material into body.

C. Dose rates and doses.

1. Relationships between dose rate and dose. (For example, the dose for two hours and for 15 minutes are twice and one fourth the per hour dose rates).

2. Dose rate and dose examples.

a. Dose limit for general public or occupational worker not under radiation protection program.

b. Dose limit for occupational workers under radiation protection program.

c. Dose for medical procedures.

d. Life endangering dose range.

e. Background levels and their influential factors.

D. Radiation risks and exposures minimization.

1. Any increases of exposures increase risks for cancer or genetic damage.

2. All occupational radiation exposures should be kept as low as reasonably achievable (ALARA).

II. Transportation of radioactive materials

A. Packages

1. Description of packages normally handled under exemption:

a. How are they constructed?

b. Why are some light and some heavy?

2. Other common radioactive material packages.

3. Differences between Limited Quantity, Type A and Type B (Quantity and Packagings).

4. Difference between "normal form" and "special form" radioactive materials in a package.

5. Difference between "fissile" and "fissile exempt" package.

B. Labels, radiation levels and placards.

1. Radiation levels generally increase from White I, to Yellow II, to Yellow III labels.

2. Label type on RAM packages depends on radiation level at package surface and at 1 meter.

3. Transport Index (TI) is equal to maximum radiation level in millirem per hour at 1 meter from the package.

4. A highway vehicle with any Yellow III labeled packages must be placarded on all four sides.

C. Shipping paper required information, and their purposes.

D. Controlling radiation exposure.

1. Normal regulatory requirements (without exemption).

a. Limitations on the surface dose rates and TI of packages.

b. A limit on the total Transport Index of all packages, e.g., 50 TI for highway vehicle.

c. Separation distances from nearest RAM packages to occupied spaces.

E. Good practices in handling RAM packages.

1. Avoid unnecessary time near RAM Packages.

2. Stow packages to minimize handling and exposure.

3. Use mechanical means to provide separation distance when moving package, when available and practical (i.e. handcarts and dollies).

4. Stow packages away from occupied spaces if possible.

5. If possible stow White I and Yellow II (low TI packages) between Yellow III packages and occupied spaces.

III. Exemption 10045 Specific Subjects

DATE: MAR 14 1989
Annex 1 to DOT-E 8308

A. Aircraft unit load devices (ULD's) transported from radioactive materials supplies directly to airport.

B. Operations authorized only from specific facilities to DOT-E 7060 exemption air carrier at specific airports.

C. Radiation protection program includes:

1. Use of radiation dosimetry devices.

2. Compliance of program with OSHA standard (29 CFR 1910.96).

3. Radiation exposures that are as low as reasonably achievable.

4. Training (exemption, 49 CFR and 29 CFR).

5. Dose to be limited to 1250 millirem per quarter.

6. Notification of personnel of current and cumulative radiation exposure, on request.

D. After loading and before departure vehicle radiation levels must be monitored and recorded.

1. Highway vehicle radiation levels must not exceed the limits of 49 CFR 173.441(b)(2), and (3).

   a. 2 milliSieverts/hour (200 millirem/hour) at surface of vehicle.

   b. 0.1 milliSievert/hour (10 millirem/hour) at 2 meters from vehicle.

E. Special papers are required to be in the vehicle with other shipping documents required by regulations.

1. Copy of the exemption (E-10045).

2. Copy of 29 CFR 1910.96.

3. Vehicle radiation survey record.

4. Emergency procedures for incidents involving RAM packages.

   a. Instructions for vehicle operators.

      (1) Actions to be taken to isolate materials and keep people away.

(2) Life-saving actions.

(3) Nonradiological factors.

(4) Notification of corporate officials.

(5) Notification and cooperation with local, state, and federal authorities.

b. Additional information and suggested instructions for emergency services personnel to follow if operator is incapacitated.

(1) General description of type of RAM carried under exemption.

(2) Who in the company (or company emergency response representative) to contact for further information about RAM in shipment.

(3) General guidance for coping with emergencies such as damaged packages, fire, and injured operator.

c. Contacting instructions and listing of names and phone

numbers (regular hours and off-duty hours) of State and Federal authorities.

F. Quarterly reports to DOT.

1. Radiation exposure reports.

2. Vehicle radiation survey summaries.

3. Descriptions and assessment of efforts to keep exposures as low as reasonably achievable.

4. Description of the health physicist activities (e.g., where, when, who and what).

G. Incidents and certain abnormal occurrences must be reported to DOT by telephone within 1 working day and by mail within 7 working days.

H. Packages containing radioactive materials with the proper shipping name "Radioactive materials, fissile, n.o.s." may not be transported with other RAM packages under the exemption.

I. Operating procedures must be established to assure there is no

unnecessary radiation exposure to personnel not handling the packages but who may be near the packages or vehicle.

J. A copy of DOT-E 10045 and 29 CFR 1910.96 must be posted in the carrier's point of origin work place for reading by workers (29 CFR 1910.96(i)).

DATE: MAR 14 1989
Annex 2 to DOT-E 8308

Qualifications and Functions of the Health Physicist

A. Basic Qualifications

A health physicist performing activities under DOT-E 10045 must meet the following requirements:

1. Possess a Bachelor's degree in a science or engineering subject; or

2. Demonstrate education and experience equivalent to a Bachelor's degree in a science or engineering subject; and

3. Demonstrate a minimum of 3 years of responsible experience in health physics. At least 2 years of this experience must include the kinds of radiation protection problems associated with the operations of the exemption holder.

B. Functions

The health physicist must--

1. Provide the technical guidance and supervision for the radiation protection program required by paragraph 7.a.

2. Conduct or arranges for and maintain records of the training required by paragraph 7.d.

3. At least semi-annually personally observe and evaluate each type of operation conducted under the exemption.

4. At least semi-annually observe and assess the actions of each person working under the exemption covered by the radiation protection program. The health physicist must discuss with the person being observed the results of any assessment performed pursuant to this item.

5. Review radiation survey records that are prepared in compliance with paragraphs 7.f. Records of these surveys must include the date and location of the survey, the survey method, date of calibration of the survey instrument used.

6. Develop procedures for ensuring that radiation levels for persons not included in the radiation protection program meet the requirements of paragraph 7.g.

7. On a monthly basis provide each person who handles packages or operates any vehicle containing radioactive materials under this

exemption with a personnel monitoring device that measures the amount of radiation exposure. Radiation exposure records for each person must be maintained on file for five years after the individual's last activity under the exemption.

8. Assess the radiation exposure for each individual covered by the radiation protection program. The assessment must include a review of monthly personnel monitoring reports with respect to quarterly, year-to-date exposure limits and lifetime radiation accumulation. A report detailing the name, occupation, monthly, quarterly and year-to-date exposure of monitored individuals, the total exposure of all monitored individuals in person-rem, and a statistical distribution of the exposures will be prepared for inclusion in the quarterly report required in 9.d. of the exemption.

9. Conduct or arrange for necessary and at least annual calibration of radiation survey equipment used by exemption holder staff and record the type and date of calibration of the survey instruments.